General

Guideline Title

Shoulder injury medical treatment guidelines.

Bibliographic Source(s)

Colorado Division of Workers' Compensation. Shoulder injury medical treatment guidelines. Denver (CO): Colorado Division of Workers' Compensation; 2015 Feb 1. 164 p.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- August 31, 2016 – Opioid pain and cough medicines combined with benzodiazepines : A U.S. Food and Drug Administration (FDA) review has found that the growing combined used of opioid medicines with benzodiazepines or other drugs that depress the central nervous system (CNS) has resulted in serious side effects, including slowed or difficult breathing and deaths. FDA is adding Boxed Warnings to the drug labeling of prescription opioid pain and prescription opioid cough medicines and benzodiazepines.
- March 22, 2016 – Opioid pain medicines : The U.S. Food and Drug Administration (FDA) is warning about several safety issues with the entire class of opioid pain medicines. These safety risks are potentially harmful interactions with numerous other medications, problems with the adrenal glands, and decreased sex hormone levels. They are requiring changes to the labels of all opioid drugs to warn about these risks.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): This summary includes the treatment recommendations of the guideline. See the original guideline document for additional information on initial evaluation, diagnostic, and maintenance procedures for patients with shoulder injuries and

for further descriptions of the therapies discussed below.

Therapeutic Procedures—Non-operative

Before initiation of any therapeutic procedure, the authorized treating provider, employer, and insurer must consider these four important issues in the care of the injured worker.

First, patients undergoing therapeutic procedure(s) should be released or returned to modified or restricted duty during their rehabilitation at the earliest appropriate time. Refer to Section F.12., "Return to Work," in the original guideline document, for detailed information.

Second, cessation and/or review of treatment modalities should be undertaken when no further significant subjective or objective improvement in the patient's condition is noted. If patients are not responding within the recommended duration periods, alternative treatment interventions, further diagnostic studies, or consultations should be pursued.

Third, providers should provide and document patient education. Functional progression is expected through prescribed activity such as neuromuscular and postural re-education/re-patterning exercises. Before diagnostic tests or referrals for invasive treatment take place, the patient should be able to clearly articulate the goals of the intervention, the general side effects and associated risks, and the patient's agreement with the expected treatment plan.

Last, formal psychological or psychosocial evaluation should be performed on patients not making expected progress within 6 to 12 weeks following injury and whose subjective symptoms do not correlate with objective signs and tests.

Home therapy is an important component of therapy and may include active and passive therapeutic procedures as well as other modalities to assist in alleviating pain, swelling, and abnormal muscle tone.

The following procedures are listed in alphabetical order.

Acupuncture

When acupuncture has been studied in randomized clinical trials, it is often compared with sham acupuncture and/or no acupuncture (usual care). The differences between true acupuncture and usual care have been moderate, but clinically important. These differences can be partitioned into two components: non-specific effects and specific effects. Non-specific effects include patient beliefs and expectations, attention from the acupuncturist, administration of acupuncture in a relaxing setting, and other components of what is often called the placebo effect. Specific effects refer to any additional effects which occur in the same setting of expectations and attention, but they are attributable to the penetration of the skin in the specific, classic acupuncture points on the surface of the body by the needles themselves.

Acupuncture is recommended for subacute or chronic pain patients who are trying to increase function and/or decrease medication usage and have an expressed interest in this modality. It is also recommended for subacute or acute pain for patients who cannot tolerate nonsteroidal anti-inflammatory drugs (NSAIDs) or other medications.

Acupuncture is not the same procedure as dry needling for coding purposes; however, some acupuncturists may use acupuncture treatment for myofascial trigger points. Dry needling is performed specifically on myofascial trigger points. Refer to Section F.4.h., "Trigger Point Injections and Dry Needling Treatment," in the original guideline document.

Acupuncture should generally be used in conjunction with manipulative and physical therapy/rehabilitation.

Credentialed practitioners with experience in evaluation and treatment of chronic pain patients must perform acupuncture evaluations prior to acupuncture treatments.

Acupuncture

This is the insertion and removal of filiform needles to stimulate acupoints (acupuncture points). Needles may be inserted, manipulated, and retained for a period of time. Acupuncture can be used to reduce pain, reduce inflammation, increase blood flow, increase range of motion, decrease the side effect of medication-induced nausea, promote relaxation in an anxious patient, and reduce muscle spasm.

Indications include joint pain, joint stiffness, soft tissue pain and inflammation, paresthesia, post-surgical pain relief, muscle spasm, and scar tissue pain.

Acupuncture with Electrical Stimulation

This is the use of electrical current (micro-amperage or milli-amperage) on the needles at the acupuncture site. It is used to increase effectiveness of

the needles by continuous stimulation of the acupoint. Physiological effects (depending on location and settings) can include endorphin release for pain relief, reduction of inflammation, increased blood circulation, analgesia through interruption of pain stimulus, and muscle relaxation. It is indicated to treat chronic pain conditions, radiating pain along a nerve pathway, muscle spasm, inflammation, scar tissue pain, and pain located in multiple sites.

Total Time Frames for Acupuncture and Acupuncture with Electrical Stimulation

Time frames are not meant to be applied to each of the above sections separately. The time frames are to be applied to all acupuncture treatments regardless of the type or combination of therapies being provided. Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Any of the above acupuncture treatments may extend longer if objective functional gains can be documented and when symptomatic benefits facilitate progression in the patient's treatment program. Treatment beyond 14 treatments must be documented with respect to need and ability to facilitate positive symptomatic and functional gains. Such care should be re-evaluated and documented with each series of treatments.

Other Acupuncture Modalities

Acupuncture treatment is based on individual patient needs and therefore treatment may include a combination of procedures to enhance treatment effect. Other procedures may include the use of heat, soft tissue manipulation/massage, and exercise. Refer to "Therapy–Active" and "Therapy–Passive" below for a description of these adjunctive acupuncture modalities and time frames.

Biofeedback

Biofeedback is a form of behavioral medicine that helps patients learn self-awareness and self-regulation skills for the purpose of gaining greater control of their physiology, such as muscle activity, brain waves, and measures of autonomic nervous system activity. Stress-related psycho-physiological reactions may arise as a reaction to organic pain and in some cases may cause pain. Electronic instrumentation is used to monitor the targeted physiology and then displayed or fed back to the patient visually, auditorily, or tactilely, with coaching by a biofeedback specialist. There is good evidence that biofeedback or relaxation therapy is equal in effect to cognitive behavioral therapy for shoulder injury.

Indications for biofeedback include cases of musculoskeletal injury, in which muscle dysfunction or other physiological indicators of excessive or prolonged stress response affects and/or delays recovery. Other applications include training to improve self-management of pain, anxiety, panic, anger or emotional distress, opioid withdrawal, insomnia/sleep disturbance, and other central and autonomic nervous system imbalances. Biofeedback is often utilized for relaxation training. Mental health professionals may also utilize it as a component of psychotherapy, where biofeedback and other behavioral techniques are integrated with psychotherapeutic interventions. Biofeedback is often used in conjunction with physical therapy or medical treatment.

Please refer to the original guideline document for recognized types of biofeedback.

The goal in biofeedback treatment is normalizing the physiology to the pre-injury status to the extent possible and involves transfer of learned skills to the workplace and daily life. Candidates for biofeedback therapy or training should be motivated to learn and practice biofeedback and self-regulation techniques. In the course of biofeedback treatment, patient stressors are discussed and self-management strategies are devised. If the patient has not been previously evaluated, a psychological evaluation should be performed prior to beginning biofeedback treatment for chronic pain. The psychological evaluation may reveal cognitive difficulties, belief system conflicts, somatic delusions, secondary gain issues, hypochondriasis, and possible biases in patient self-reports, which can affect biofeedback. Home practice of skills is often helpful for mastery and may be facilitated by the use of home training tapes.

Psychologists or psychiatrists who provide psycho-physiological therapy, which integrates biofeedback with psychotherapy, should be either Biofeedback Certification International Alliance (BCIA) certified or practicing within the scope of their training. All non-licensed health care providers of biofeedback for chronic pain patients must be BCIA certified and shall have their biofeedback treatment plan approved by the authorized treating psychologist or psychiatrist. Biofeedback treatment must be done in conjunction with the patient's psychosocial intervention. Biofeedback may also be provided by health care providers who follow a set treatment and educational protocol. Such treatment may utilize standardized material or relaxation tapes.

Coordination between the biofeedback provider and the other health care providers is strongly encouraged.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Extracorporeal Shock Wave Therapy (ESWT) and Radial Shock Wave Therapy

Shock wave therapy is used to increase function and decrease pain in patients with specified types of calcific tendinitis who have failed

conservative therapy. It is not a first line of therapy. ESWT uses acoustic impulses with duration in microseconds focused on the target tissue. The mechanism of action is not known, but is not likely to be simply the mechanical disintegration of the calcium deposit. High-energy application of ESWT may be painful, and rare complications such as osteonecrosis of the humeral head have been reported. Dosage is established according to patient tolerance. There is some evidence that low energy radial shock wave therapy may be beneficial in the setting of calcific tendinitis. This technique is less painful than high energy ESWT and can be specifically directed. There is also good evidence that both high energy and low energy ESWT may provide functional benefits in the setting of calcific tendinitis, and may reduce the size of the calcific deposits and reduce pain. In the absence of a documented calcium deposit, there is no evidence that ESWT is effective and its use in this setting is *not recommended*. Neither anesthesia nor conscious sedation is required nor is it recommended for this procedure. There is no evidence that results with fluoroscopic guidance or with computer-assisted navigation are superior to results obtained by palpation. These are *not recommended*.

Indications

Indications include patients with calcific tendinitis who have not achieved functional goals after 2 to 3 months of active therapy. The calcium deposits must be Type I, homogenous calcification with well-defined borders or Type II, heterogeneous with sharp border or homogenous with no defined border.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Injections–Therapeutic

Description

Therapeutic injection procedures are generally accepted, well-established procedures that may play a significant role in the treatment of patients with upper extremity pain or pathology. Therapeutic injections involve the delivery of anesthetic and/or anti-inflammatory medications to the painful structure. Therapeutic injections have many potential benefits. Ideally, a therapeutic injection will: (a) reduce inflammation in a specific target area; (b) relieve secondary muscle spasm; (c) allow a break from pain; and (d) support therapy directed to functional recovery. Diagnostic and therapeutic injections should be used early and selectively to establish a diagnosis and support rehabilitation. If injections are overused or used outside the context of a monitored rehabilitation program, they may be of significantly less value.

Caution should be used when ordering four or more steroid injections total for all anatomic sites in one year. Please refer to Section F.4.d., "Shoulder Joint Steroid Injections," in the original guideline document.

Diagnostic injections are procedures which may be used to identify pain generators or pathology. For additional specific clinical indications, see Specific Diagnosis, Testing and Treatment Procedures, below.

Contraindications

General contraindications include local or systemic infection, bleeding disorders, allergy to medications used and patient refusal. Specific contraindications may apply to individual injections.

Botulinum Toxin Injections

Description: Botulinum toxin injections are used to temporarily weaken or paralyze muscles. They may reduce muscle pain in conditions associated with spasticity, dystonia, or other types of painful muscle spasm. Neutralizing antibodies develop in at least 4% of patients treated with botulinum toxin type A, rendering it ineffective. Several antigenic types of botulinum toxin have been described.

Indications: For conditions which produce cervical dystonia, bursitis, or impingement. There should be evidence of limited range-of-motion prior to the injection.

There is insufficient evidence to support its use for other myofascial trigger points for longer-term pain relief and it is likely to cause muscle weakness or atrophy if used repeatedly. Examples of such consequences include subacromial impingement, as the stabilizers of the shoulder are weakened by repeated injections of trigger points in the upper trapezii. Therefore it is *not recommended* for use for other myofascial trigger points.

Complications: There is good evidence that cervical botulinum toxin A injections cause transient dysphagia and neck weakness. Allergic reaction to medications, dry mouth and vocal hoarseness may also occur. Rare systemic effects include flu-like syndrome, and weakening of distant muscle. There is an increased risk of systemic effects in patients with motor neuropathy or disorders of the neuromuscular junction.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Platelet Rich Plasma (PRP)

PRP is *not generally recommended.* It may be considered in unusual circumstances for cases which meet the following three criteria:

- Tendon damage; *and*
- Those who have not responded to appropriate conservative measures; *and*
- Those for whom the next level of guideline-consistent therapy would involve an invasive procedure with risk of significant complications

If PRP is found to be indicated in these select patients, the first injection may be repeated once after 4 weeks when significant functional benefit is reported but the patient has not returned to full function or full duty at work.

Prolotherapy (also known as Sclerotherapy/Regenerative Injection Therapy)

Prolotherapy consists of peri- or intra-ligamentous injections of hypertonic dextrose with or without phenol with the goal of inducing an inflammatory response that will recruit cytokine growth factors involved in the proliferation of connective tissue. Advocates of prolotherapy propose that these injections will alleviate complaints related to joint laxity by promoting the growth of connective tissue and stabilizing the involved joint.

The evidence in support of prolotherapy is insufficient and therefore, its use is *not recommended* in upper extremity injuries.

Shoulder Joint Steroid Injections

These are generally accepted, well-established procedures that can be performed as analgesic or anti-inflammatory procedures. Common shoulder joint injections include anterior and posterior glenohumeral and acromioclavicular. There is some evidence that ultrasound-guided injection of corticosteroid into the shoulder provides a more anatomically accurate injection and is likely to have a small to moderate advantage over landmark-guided injection for pain relief at 6 weeks after the injection.

Complications: General complications of injections may include transient neurapraxia, nerve injury, infection, hematoma, glucose elevation, and endocrine changes.

Refer to the original guideline document for information on complications, particularly in specific patient populations.

Refer to the original guideline document for time to produce effect and optimum and maximum duration of treatments.

Soft Tissue Injections

These include bursa and tendon insertions. Injections under significant pressure should be avoided as the needle may be penetrating the tendon. Injection into the tendon can cause tendon degeneration, tendon breakdown, or rupture. Injections should be minimized for patients under 30 years of age.

The risk of tendon rupture should be discussed with the patient and the need for restricted duty emphasized.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Subacromial Injections

There is some evidence that in patients with chronic shoulder pain with or without accompanying stiffness, individually tailored exercise therapy aimed at restoring dynamic joint stabilizing mechanisms and muscle coordination, or a single unguided subacromial injection of corticosteroid, or a combination of various physical modalities and ROM exercises is equally effective in the short term.

There is some evidence that a subacromial injection of 60 mg of ketorolac is at least as effective as injection of 40 mg of triamcinolone in the short-term treatment of subacromial impingement syndrome.

There is some evidence that 6 sessions of manual physical therapy over a three week period are as effective as an injection of 40 mg triamcinolone for relief of symptoms of shoulder impingement and impairment up to one year after initial treatment. The same study also showed reduced use of health care services one year in the manual therapy group.

There is strong evidence that subacromial steroid injections for rotator cuff tendinopathy have a rapid benefit. However, there is no evidence that differ from alternative therapies for intermediate or long-term relief.

There is some evidence that both subacromial corticosteroid injection and a series of 10 acupuncture treatments combined with home exercises significantly decreased pain and improved shoulder function in patients with subacromial impingement syndrome, but neither treatment was significantly superior to the other.

There is some evidence that ultrasound-guided injections of corticosteroid into the shoulder provides a more anatomically accurate injection and is likely to have a small to moderate advantage over landmark-guided injection for pain relief at 6 weeks after the injection.

There is some evidence that when subacromial injections are done without imaging guidance, there are no differences between anteromedial versus posteromedial approaches to subacromial injection with respect to accuracy or effectiveness, however the rotator cuff is frequently inadvertently injected with either approach.

If there is a concern regarding needle placement, sonography or fluoroscopy may be used. The subacromial injection may also be repeated by a specialist skilled in this procedure to confirm the diagnosis.

Please refer to "Shoulder Joint Steroid Injections" above for steroid complications and number of treatments.

Suprascapular Nerve Block

There is no clear long-term functional benefit for suprascapular nerve blocks; however, blocks may be appropriate for patients when pain is not well-controlled and injections improve function. These blocks may delay onset of significant pain post-surgery. There is no clear evidence of long-term functional gains in nonspecific shoulder pain, acromioclavicular joint disease, or rotator cuff disease.

Refer to the original guideline document for time to produce effect and maximum duration of treatments.

Trigger Point Injections and Dry Needling Treatment

Description: Trigger point injections are a generally accepted treatment. Trigger point treatment can consist of dry needling or injection of local anesthetic, with or without corticosteroid, into highly localized, extremely sensitive bands of skeletal muscle fibers that produce local and referred pain when activated. Medication is injected in a four-quadrant manner in the area of maximum tenderness. Injection efficacy can be enhanced if injections are immediately followed by myofascial therapeutic interventions, such as vapo-coolant spray and stretch, ischemic pressure massage (myotherapy), specific soft tissue mobilization and physical modalities. There is conflicting evidence regarding the benefit of trigger point injections. A truly blinded study comparing dry needle treatment of trigger points is not feasible. There is no evidence that injection of medications improves the results of trigger-point injections. Needling alone may account for some of the therapeutic response. Needling must be performed by practitioners with the appropriate credentials in accordance with state and other applicable regulations.

There is no indication for conscious sedation for patients receiving trigger point injections. The patient must be alert to help identify the site of the injection.

Indications: Trigger point injections may be used to relieve myofascial pain and facilitate active therapy and stretching of the affected areas. They are to be used as an adjunctive treatment in combination with other treatment modalities such as active therapy programs. Trigger point injections should be utilized primarily for the purpose of facilitating functional progress. Patients should continue in an aggressive aerobic and stretching therapeutic exercise program as tolerated throughout the time period they are undergoing intensive myofascial interventions. Myofascial pain is often associated with other underlying structural problems and any abnormalities need to be ruled out prior to injection.

Trigger point injections are indicated in those patients where well circumscribed trigger points have been consistently observed, demonstrating a local twitch response, characteristic radiation of pain pattern and local autonomic reaction, such as persistent hyperemia following palpation. Generally, these injections are not necessary unless consistently observed trigger points are not responding to specific, noninvasive, myofascial interventions within approximately a 6-week time frame. However, trigger point injections may be occasionally effective when utilized in the patient with immediate, acute onset of pain.

Complications: Potential but rare complications of trigger point injections include infection, pneumothorax, anaphylaxis, penetration of viscera, neurapraxia, and neuropathy. If corticosteroids are injected in addition to local anesthetic, there is a risk of local myopathy. Severe pain on injection suggests the possibility of an intraneural injection, and the needle should be immediately repositioned.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Viscosupplementation/Intracapsular Acid Salts

This procedure involves the injection of hyaluronic acid and its derivatives into the glenohumeral joint space. Hyaluronic acid is secreted into the joint space by the healthy synovium and has functions of lubrication and cartilage protection. As of the time of this guidelines writing, viscosupplementation has been FDA approved for the treatment of knee osteoarthritis when conservative non-pharmacologic treatment and simple analgesics (e.g., acetaminophen) have failed. Specific indications may vary according to the brand-name product. The FDA has not approved this for use in the shoulder.

There is insufficient evidence of the effectiveness of hyaluronate in rotator cuff tendinopathy, therefore it is *not recommended* for this condition.

There is some evidence that hyaluronic acid (HA) added to physical therapy (PT) does not improve symptomatic and functional outcomes of adhesive capsulitis over the improvements seen with PT alone. Therefore, it is *not recommended*.

There is good evidence that subacromial injection of hyaluronic acid is not more effective than steroid or placebo for pain relief and functional improvement of subacromial impingement syndrome. Therefore, it is *not recommended*.

There is good evidence that three weekly injections of HA alleviate the symptoms of glenohumeral osteoarthritis for up to 26 weeks in the absence of other shoulder pathology.

Refer to the original guideline document for indications, optimum and maximum duration of treatments.

Interdisciplinary Rehabilitation Programs

This is the gold standard of treatment for individuals who have not responded to less intensive modes of treatment. There is good evidence that interdisciplinary programs which include screening for psychological issues, identification of fear-avoidance beliefs and treatment barriers, and establishment of individual functional and work goals will improve function and decrease disability. These programs should assess the impact of pain and suffering on the patient's medical, physical, psychological, social, and/or vocational functioning. In general, interdisciplinary programs evaluate and treat multiple and sometimes irreversible conditions, including, but not limited to: painful musculoskeletal, neurological, and other chronic pain conditions and psychological issues; drug dependence, abuse, or addiction; high levels of stress and anxiety; failed surgery; and pre-existing or latent psychopathology. The number of professions involved on the team in a chronic pain program may vary due to the complexity of the needs of the person served. The Division recommends consideration of referral to an interdisciplinary program within six months post-injury in patients with delayed recovery, unless successful surgical interventions or other medical and/or psychological treatment complications intervene.

Chronic pain patients need to be treated as outpatients within a continuum of treatment intensity. Outpatient chronic pain programs are available with services provided by a coordinated interdisciplinary team within the same facility (formal) or as coordinated among practices by the authorized treating physician (informal). Formal programs are able to provide a coordinated, high-intensity level of services and are recommended for most chronic pain patients who have received multiple therapies during acute management.

Patients with addiction problems, high-dose opioid use, or use of other drugs of abuse may require inpatient and/or outpatient chemical dependency treatment programs before or in conjunction with other interdisciplinary rehabilitation. Guidelines from the American Society of Addiction Medicine are available and may be consulted relating to the intensity of services required for different classes of patients in order to achieve successful treatment.

Informal interdisciplinary pain programs may be considered for patients who are currently employed, those who cannot attend all-day programs, those with language barriers, or those living in areas not offering formal programs. Before treatment has been initiated, the patient, physician, and insurer should agree on treatment approach, methods, and goals. Generally, the type of outpatient program needed will depend on the degree of impact the pain has had on the patient's medical, physical, psychological, social, and/or vocational functioning.

When referring a patient for formal outpatient interdisciplinary pain rehabilitation, an occupational rehabilitation program, or an opioid treatment program, the Division recommends the program meets the criteria of the Commission on Accreditation of Rehabilitation Facilities (CARF).

Inpatient pain rehabilitation programs are rarely needed but may be necessary for patients with any of the following conditions: (a) high risk for medical instability; (b) moderate-to-severe impairment of physical/functional status; (c) moderate-to-severe pain behaviors; (d) moderate impairment of cognitive and/or emotional status; (e) dependence on medications from which he/she needs to be withdrawn; and (f) the need for 24-hour supervised nursing.

Whether formal or informal programs, they should be comprised of the following dimensions:

- Communication
- Documentation
- Treatment modalities
- Therapeutic exercise programs
- Return-to-work
- Patient education
- Psychosocial evaluation and treatment
- Vocational assistance

Interdisciplinary programs are characterized by a variety of disciplines that participate in the assessment, planning, and/or implementation of the treatment program. These programs are for patients with greater levels of perceived disability, dysfunction, deconditioning, and psychological involvement. Programs should have sufficient personnel to work with the individual in the following areas: behavioral, functional, medical, cognitive, pain management, psychological, social, and vocational.

Formal Interdisciplinary Rehabilitation Programs

Interdisciplinary Pain Rehabilitation

An Interdisciplinary Pain Rehabilitation Program provides outcome-focused, coordinated, goal-oriented interdisciplinary team services to measure and improve the functioning of persons with pain and encourage their appropriate use of health care system and services. The program can benefit persons who have limitations that interfere with their physical, psychological, social, and/or vocational functioning. The program shares information about the scope of the services and the outcomes achieved with patients, authorized providers, and insurers.

The interdisciplinary team maintains consistent integration and communication to ensure that all interdisciplinary team members are aware of the plan of care for the patient, are exchanging information, and implement the plan of care. The team members make interdisciplinary team decisions with the patient and then ensure that decisions are communicated to the entire care team.

The Medical Director of the pain program should ideally be board certified in pain management, or he/she should be board certified in his/her specialty area and have completed a one-year fellowship in interdisciplinary pain medicine or palliative care recognized by a national board or have two years of experience in an interdisciplinary pain rehabilitation program. Teams that assist in the accomplishment of functional, physical, psychological, social, and vocational goals must include: a medical director, pain team physician(s), who should preferably be board certified in an appropriate specialty, and a pain team psychologist. Professionals from other disciplines on the team may include, but are not limited to: a biofeedback therapist, an occupational therapist, a physical therapist, a registered nurse (RN), a case manager, an exercise physiologist, a psychologist, a psychiatrist, and/or a nutritionist.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Occupational Rehabilitation

This is a formal interdisciplinary program addressing a patient's employability and return to work. It includes a progressive increase in the number of hours per day that a patient completes work simulation tasks until the patient can tolerate a full work day. A full work day is case specific and is defined by the previous employment of the patient. Safe workplace practices and education of the employer and family and/or social support system regarding the person's status should be included. This is accomplished by addressing the medical, psychological, behavioral, physical, functional, and vocational components of employability and return to work.

There is some evidence that an integrated care program, consisting of workplace interventions and graded activity teaching that pain need not limit activity, is effective in returning patients with shoulder injury to work, even with minimal reported reduction of pain.

The occupational medicine rehabilitation interdisciplinary team should, at a minimum, be comprised of a qualified medical director who is board certified with documented training in occupational rehabilitation; team physicians having experience in occupational rehabilitation; an occupational therapist; and a physical therapist.

As appropriate, the team may also include any of the following: chiropractor, an RN, a case manager, a psychologist, a vocational specialist, or a certified biofeedback therapist.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Opioid/Chemical Treatment Programs

Refer to the NGC summary of the Division's Chronic pain disorder medical treatment guidelines.

Informal Interdisciplinary Rehabilitation Program

A coordinated interdisciplinary pain rehabilitation program is one in which the authorized treating physician coordinates all aspects of care. This type of program is similar to the formal programs in that it is goal-oriented and provides interdisciplinary rehabilitation services to manage the needs of the patient in the following areas: (a) functional, (b) medical, (c) physical, (d) psychological, (e) social, and (f) vocational.

This program is different from a formal program in that it involves lower frequency and intensity of services/treatment. Informal rehabilitation is geared toward those patients who do not need the intensity of service offered in a formal program or who cannot attend an all-day program due to employment, daycare, language, or other barriers.

Patients should be referred to professionals experienced in outpatient treatment of chronic pain. The Division recommends the authorized treating physician consult with physicians experienced in the treatment of chronic pain to develop the plan of care. Communication among care providers regarding clear objective goals and progress toward the goals is essential. Employers should be involved in return to work and work restrictions, and the family and/or social support system should be included in the treatment plan. Professionals from other disciplines likely to be involved include: a biofeedback therapist, an occupational therapist, a physical therapist, an RN, a psychologist, a case manager, an exercise physiologist, a psychiatrist, and/or a nutritionist.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of treatments.

Jobsite Alteration

Early evaluation and training of body mechanics are essential for every injured worker. Risk factors to be addressed include repetitive overhead work, lifting and/or tool use. In some cases, this requires a jobsite evaluation. There is no single factor or combination of factors that is proven to prevent or ameliorate shoulder pain, but a combination of ergonomic and psychosocial factors are generally considered to be important. Physical factors that may be considered include use of force, repetitive overhead work, and awkward overhead positions requiring use of force, upper extremity vibration, and contact pressure on the nerve. Psychosocial factors to be considered include pacing, degree of control over job duties, perception of job stress, and supervisory support.

The job analysis and modification should include input from the employee, employer, and ergonomist or other professional familiar with work place evaluation. The employee must be observed performing all job functions in order for the jobsite analysis to be valid. Periodic follow-up is recommended to evaluate effectiveness of the intervention and need for additional ergonomic changes.

Ergonomic Changes

Ergonomic changes may be made to modify the hazards identified. In addition, workers should be counseled to vary tasks throughout the day whenever possible. The Occupational Safety and Health Administration (OSHA) suggests that workers who perform overhead repetitive tasks with or without force take 15 to 30 second breaks every 10 to 20 minutes, or 5-minute breaks every hour. Mini-breaks should include stretching exercises.

Interventions

Interventions that should be considered include engineering controls (e.g., mechanizing the task, changing the tool used, or adjusting the jobsite), or administrative controls (e.g., adjusting the time an individual performs the task).

Temporary restrictions may be needed while recommended ergonomic or adaptive equipment is obtained; employers should obtain recommended equipment in a timely manner.

Medications

For the treatment of upper extremity injuries, it is appropriate to control acute pain and inflammation. Use of medications will vary widely due to the spectrum of injuries from simple strains to complicated fractures. All drugs should be used according to patient needs. A thorough medication history, including use of alternative and over-the-counter medications, should be performed at the time of the initial visit and be updated periodically. Treatment for pain control is initially accomplished with acetaminophen and/or nonsteroidal anti-inflammatory drugs (NSAIDs). The patient should be educated regarding the interaction with prescription and over-the-counter medications as well as the contents of over-the-counter herbal products.

NSAIDs and acetaminophen are useful in the treatment of injuries associated with degenerative joint disease and/or inflammation. These same medications can be used for pain control.

Topical agents may be beneficial for pain management in some patients with upper extremity injuries. These include topical capsaicin, nonsteroidal, as well as, topical iontophoretics/phonophoretics, such as steroid creams and lidocaine.

Refer to the original guideline document for additional information about each of the medications listed below, including optimum and maximum duration of treatment.

- Acetaminophen
- Minor tranquilizer/muscle relaxants (chronic use of benzodiazepines or any muscle relaxant is *not recommended*)
- NSAIDs (chronic use of NSAIDs is generally *not recommended*)
- Opioids (use beyond 30 days after non-traumatic injuries, or 6 weeks post-surgery after the original injury or post-operatively is *not*

recommended)
- Platelet rich therapy
- Psychotropic/anti-anxiety/hypnotic agents (due to the habit-forming potential of the benzodiazepines and other drugs found in this class, they are *not generally recommended*)
- Tramadol (*not recommended* for those with prior opioid addiction)
- Topical drug delivery

Orthotics and Prosthetics

Refer to the original guideline document for additional information about orthotics and prosthetics listed below, including time to produce effect, frequency, and optimum and maximum duration of treatment.

- Fabrication/modification of orthotics
- Orthotic/prosthetic training
- Splints or adaptive equipment

Education/Informed Decision Making

Education/informed decision making of the patient and family, as well as the employer, insurer, policy makers and the community should be the primary emphasis in the treatment of shoulder pain and disability. Unfortunately, practitioners often think of education and informed decision making last, after medications, manual therapy, and surgery.

Informed decision making is the hallmark of a successful treatment plan. In most cases the continuum of treatment from the least invasive to the most invasive (e.g., surgery) should be discussed. The intention is to find the treatment along this continuum which most completely addresses the condition. Patients should identify their personal functional goals of treatment at the first visit. It is recommended that specific individual goals are articulated at the beginning of treatment as this is likely to lead to increased patient satisfaction above that achieved from improvement in pain or other physical function. Progress toward the individual functional goals identified should be addressed at follow up visits and throughout treatment by other members of the health care team as well as the authorized physicians.

Documentation of this process should occur whenever diagnostic tests or referrals from the authorized treating physician are contemplated. The informed decision making process asks the patient to set their personal functional goals of treatment, describe their current health status and any concerns they have regarding adhering to the diagnostic or treatment plan proposed. The provider should clearly describe the following:

- The expected functional outcomes from the proposed treatment, or expected results and plan of action if diagnostic tests are involved
- Any side effects and risks to the patient
- Required post-treatment rehabilitation time and impact on work, if any
- Alternative therapies or diagnostic testing

Before diagnostic tests or referrals for invasive treatment take place the patient should be able to clearly articulate the goals of the intervention, the general side effects and risks associated with it and their decision regarding compliance with the suggested plan. There is some evidence that information provided only by video is not sufficient education.

Practitioners must develop and implement an effective strategy and skills to educate patients, employers, insurance systems, policy makers, and the community as a whole. An education-based paradigm should always start with providing reassuring information to the patient and informed decision making. More in-depth education currently exists within a treatment regimen employing functional restoration, prevention, and cognitive behavioral techniques. Patient education and informed decision making should facilitate self-management of symptoms and prevention.

Personality/Psychological/Psychosocial Intervention

Psychosocial treatment is a well-established therapeutic and diagnostic intervention with selected use in acute pain problems and more widespread use in sub-acute and chronic pain populations. Psychosocial treatment is recommended as an important component in the total management of a patient with chronic pain and should be implemented as soon as the problem is identified.

If a diagnosis consistent with the standards of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM) has been determined, the patient should be evaluated for the potential need for psychiatric medications. Use of any medication to treat a diagnosed condition may be ordered by the authorized treating physician or by the consulting psychiatrist. Visits for management of psychiatric medications are medical in nature and are not a component of psychosocial treatment. Therefore, separate visits for medication management may be necessary, depending on the patient and medications selected.

Psychosocial interventions include psychotherapeutic treatments for mental health conditions, as well as behavioral medicine treatments. These interventions may similarly be beneficial for patients without psychiatric conditions, but who may need to make major life changes in order to cope with pain or adjust to disability. Examples of these treatments include cognitive behavioral therapy (CBT), relaxation training, mindfulness training, and sleep hygiene training.

The screening or diagnostic workup should clarify and distinguish between pre-existing, aggravated, and/or purely causative psychological conditions. Therapeutic and diagnostic modalities include, but are not limited to, individual counseling and group therapy. Treatment can occur within an individualized model, a multi-disciplinary model, or a structured pain management program.

A psychologist with a PhD, PsyD, EdD credentials, or a psychiatric MD/DO may perform psychosocial treatments. Other licensed mental health providers or licensed health care providers with training in CBT, or certified as CBT therapists who have experience in treating chronic pain disorders in injured workers, may also perform treatment in consultation with a PhD, PsyD, EdD, or psychiatric MD/DO.

CBT refers to a group of psychological therapies that are sometimes referred to by more specific names, such as Rational Emotive Behavior Therapy, Rational Behavior Therapy, Rational Living Therapy, Cognitive Therapy, and Dialectic Behavior Therapy. Variations of CBT methods can be used to treat a variety of conditions, including chronic pain, depression, anxiety, phobias, and post-traumatic stress disorder (PTSD). For patients with multiple diagnoses, more than one type of CBT might be needed. The CBT used in research studies is often "manualized CBT," meaning that the treatment follows a specific protocol in a manual. In clinical settings, CBT may involve the use of standardized materials, but it is also commonly adapted by a psychologist or psychiatrist to the patient's unique circumstances. If the CBT is being performed by a non-mental health professional, a manual approach would be strongly recommended. CBT must be distinguished from neuropsychological therapies used to teach compensatory strategies to brain injured patients, which are also called "cognitive therapy."

It should be noted that most clinical trials on CBT exclude subjects who have significant psychiatric diagnoses. Consequently, the selection of patients for CBT should include the following considerations. CBT is instructive and structured, using an educational model with homework to teach inductive rational thinking. Because of this educational model, a certain level of literacy is assumed for most CBT protocols. Patients who lack the cognitive and educational abilities required by a CBT protocol are unlikely to be successful. Further, given the highly structured nature of CBT, it is more effective when a patient's circumstances are relatively stable. For example, if a patient is about to be evicted, is actively suicidal, or is coming to sessions intoxicated, these matters will generally preempt CBT treatment for pain, and require other types of psychotherapeutic response. Conversely, literate patients whose circumstances are relatively stable, but who catastrophize or cope poorly with pain or disability are often good candidates for CBT for pain. Similarly, literate patients whose circumstances are relatively stable, but who exhibit unfounded medical phobias, are often good candidates for CBT for anxiety.

CBT is often combined with active therapy in an interdisciplinary program, whether formal or informal. It must be coordinated with a psychologist or psychiatrist. CBT can be done in a small group or individually, and the usual number of treatments varies between 8 and 16 sessions.

Before CBT is done, the patient must have a full psychological evaluation. The CBT program must be done under the supervision of a PhD, PsyD, EdD, or psychiatric MD/DO.

Psychological Diagnostic and Statistical Manual of Mental Disorders (DSM) Axis I disorders are common in chronic pain. One study demonstrated that the majority of patients who had failed other therapy and participated in an active therapy program also suffered from major depression. However, in a program that included CBT and other psychological counseling, the success rate for return to work was similar for those with and without a DSM IV diagnosis. This study further strengthens the argument for having some psychological intervention included in all chronic pain treatment plans.

For all psychological/psychiatric interventions, an assessment and treatment plan with measurable behavioral goals, time frames, and specific interventions planned, must be provided to the treating physician prior to initiating treatment. A status report must be provided to the authorized treating physician every two weeks during initial more frequent treatment and monthly thereafter. The report should provide documentation of progress toward functional recovery and a discussion of the psychosocial issues affecting the patient's ability to participate in treatment. The report should also address pertinent issues such as pre-existing, aggravated, and/or causative issues, as well as realistic functional prognosis.

Refer to the original guideline document for time to produce effect, frequency, and optimum and maximum duration of CBT and other psychological/psychiatric therapies.

Restriction of Activities

Continuation of normal daily activities is the recommendation for most patients since immobility will negatively affect rehabilitation. Prolonged immobility results in a wide range of deleterious effects, such as a reduction in aerobic capacity and conditioning, loss of muscle strength and flexibility, increased segmental stiffness, promotion of bone demineralization, impaired disc nutrition, and the facilitation of the illness role.

Some level of immobility may occasionally be appropriate which could include bracing. While these interventions may occasionally have been ordered in the acute phase, the provider should be aware of their impact on the patient's ability to adequately comply with and successfully complete rehabilitation. Activity should be increased based on the improvement of core strengthening.

Patients should be educated regarding the detrimental effects of immobility versus the efficacious use of limited rest periods. Adequate rest allows the patient to comply with active treatment and benefit from the rehabilitation program. In addition, complete work cessation should be avoided, if possible, since it often further aggravates the pain presentation and promotes disability. Modified return to work is almost always more efficacious and rarely contraindicated in the vast majority of injured workers.

Return-to-Work

Return-to-work and/or work-related activities whenever possible is one of the major components in treatment and rehabilitation. Return to work is a subject that should be addressed by each workers' compensation provider at the first meeting with the injured employee and updated at each additional visit. A return-to-work format should be part of a company's health plan, knowing that return to work can decrease anxiety, reduce the possibility of depression, and reconnect the worker with society.

Because a prolonged period of time off work will decrease the likelihood of return to work, the first weeks of treatment are crucial in preventing and/or reversing chronicity and disability mindset. In complex cases, experienced nurse case managers may be required to assist in return to work. Other services, including psychological evaluation and/or treatment, jobsite analysis, and vocational assistance, may be employed. Two counseling sessions with an occupational physician, and work site visit if necessary, may be helpful for workers who are concerned about returning to work.

The following should be considered when attempting to return an injured worker with chronic pain to work.

- Job history interview
- Coordination of care
- Communication
- Establishment of return-to-work status
- Establishment of activity level restrictions
- Rehabilitation and return to work
- Vocational assistance

Refer to the original guideline document for additional information.

Recommendations to Employers and Employees of Mid-sized and Large Businesses

Employers are encouraged by the Division to identify modified work within the company that may be available to injured workers with chronic pain who are returning to work with temporary or permanent restrictions. To assist with temporary or permanent placement of the injured worker, it is suggested that a program be implemented that allows the case manager to access descriptions of all jobs within the organization.

Therapy–Active

The following active therapies are widely used and accepted methods of care for a variety of work-related injuries. They are based on the philosophy that therapeutic exercise and/or activity are beneficial for restoring flexibility, strength, endurance, function, range of motion, and can alleviate discomfort. Active therapy requires an internal effort by the individual to complete a specific exercise or task. This form of therapy requires supervision from a therapist or medical provider such as verbal, visual and/or tactile instruction(s). At times, the provider may help stabilize the patient or guide the movement pattern but the energy required to complete the task is predominately executed by the patient.

The use and integration of active and passive therapies should be directed at addressing impairments found in the clinical examination which may include abnormal posture, head tilting forward, scapula dyskinesia and joint/tissue hypomobility/hypermobility. These clinical findings are frequently contributors to shoulder and thoracic outlet symptoms and many times result in scapula anterior tipping and altered motor control of the scapula/thoracic and glenohumeral joints.

Patients should be instructed to continue active therapies at home as an extension of the treatment process in order to maintain improvement levels. Follow-up visits to reinforce and monitor progress and proper technique are recommended. Home exercise can include exercise with or without mechanical assistance or resistance and functional activities with assistive devices. Frequency times and duration of treatment given in the original guideline document apply only to diagnoses not previously covered in Section E of the guideline.

The use of a patient completed pain drawing, visual analog scale (VAS), and functional outcome tools is highly recommended to help providers track progress. Functional objective goals including minimum clinically important difference (MCID) of the functional tools should be monitored

and documented regularly to determine the effectiveness of treatment.

On occasion, specific diagnoses and post-surgical conditions may warrant durations of treatment beyond those listed as "maximum." Factors such as exacerbation of symptoms, re-injury, interrupted continuity of care and co-morbidities may also extend durations of care. Specific goals with objectively measured functional improvement during treatment must be cited to justify extended durations of care. It is recommended that, if no functional gain is observed after the number of treatments under "time to produce effect" have been completed, then alternative treatment interventions, further diagnostic studies, or further consultations should be pursued.

The following active therapies are listed in alphabetical order. Refer to the original guideline document for a description of the following active therapies including time to product effect, frequency, and optimum and maximum duration of treatment:

- Activities of daily living (ADLs)
- Aquatic therapy
- Functional activities
- Functional electrical stimulation
- Neuromuscular re-education
- Therapeutic exercise

Therapy–Passive

Most of the following passive therapies and modalities are generally accepted methods of care for a variety of work-related injuries. Passive therapy includes those treatment modalities that do not require energy expenditure on the part of the patient. They are principally effective during the early phases of treatment and are directed at controlling symptoms such as pain, inflammation and swelling and to improve the rate of healing soft tissue injuries. They should be used adjunctively with active therapies to help control swelling, pain, and inflammation during the rehabilitation process. They may be used intermittently as a therapist deems appropriate or regularly if there are specific goals with objectively measured functional improvements during treatment.

On occasion, specific diagnoses and post-surgical conditions may warrant durations of treatment beyond those listed as "maximum." Factors such as exacerbation of symptoms, re-injury, interrupted continuity of care, and comorbidities may also extend durations of care. Specific goals with objectively measured functional improvement during treatment must be cited to justify extended durations of care. It is recommended that, if no functional gain is observed after the number of treatments under "time to produce effect" have been completed, alternative treatment interventions, further diagnostic studies, or further consultations should be pursued.

The following passive therapies and modalities are listed in alphabetical order. Refer to the original guideline document for a description of the following passive therapies including time to product effect, frequency, and optimum and maximum duration of treatment:

- Continuous passive motion (CPM) (*not generally recommended*)
- Electrical stimulation (unattended)
- Hyperbaric oxygen therapy (*not recommended*)
- Immobilization
- Iontophoresis
- Low level laser therapy (*not recommended*)
- Manipulation
- Manual electrical stimulation
- Massage—manual or mechanical
- Microwave diathermy (*not recommended*)
- Mobilization (joint)
- Mobilization (soft tissue)
- Superficial heat and cold therapy
- Transcutaneous electrical nerve stimulation (TENS)
- Ultrasound (including phonophoresis)

Therapeutic Procedures—Operative

All operative interventions must be based upon positive correlation of clinical findings, clinical course and diagnostic tests. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic condition(s). It is imperative to rule out nonphysiologic modifiers of pain presentation or non-operative conditions mimicking operative conditions (e.g., peripheral neuropathy, myofascial pain, scleratogenous or sympathetically mediated pain syndromes, psychological), prior to consideration of elective surgical intervention.

In addition, operative treatment is indicated when the natural history of surgically treated lesions is better than the natural history for non-operatively treated lesions. All patients being considered for surgical intervention should first undergo a comprehensive neuro-musculoskeletal examination to identify mechanical pain generators that may respond to non-surgical techniques or may be refractory to surgical intervention.

Structured rehabilitation interventions should strongly be considered post-operatively in any patient not making expected functional progress within three weeks after surgery.

Post-operative therapy will frequently require a repeat of the therapy provided pre-operatively. Refer to "Therapeutic Procedures—Non-operative" above and Section F of the original guideline document, and consider the first post-operative visit as visit number one, for the time frame parameters provided.

The patient and treating physician have identified functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work activities. The patient should agree to comply with the pre- and post-operative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of post-operative treatment required and the length of partial- and full-disability expected post-operatively. The patient should have committed to the recommended post-operative treatment plan and fully completed the recommended active, manual and pre-operative treatment plans.

Informed decision making should be documented for all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. Since most patients with the most common conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment.

Arthrodesis

Surgical Indications

Surgical indications include inability to perform activities of daily living due to failed previous procedures and severe chronic pain unresponsive to non-addicting medication.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work activities. The patient should also agree to comply with the pre- and post-operative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected post-operatively.

Informed decision making should be documented for all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. Since most patients with the most common conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment.

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery.

Hardware Removal

Surgical Indications

Surgical indications include persistent local pain and irritation around hardware.

Post-operative Treatment

Post-operative treatment includes an individualized rehabilitation program based upon communication between the surgeon and the therapist.

Early rehabilitation interventions are recommended to maintain range-of-motion and progressive strengthening.

Return to work and restrictions after surgery may be made by an experienced primary occupational medicine physician in consultation with the surgeon or by the surgeon. The injured worker should adhere to the written return to work restrictions not only in the workplace, but at home and for 24 hours a day.

Manipulation Under Anesthesia

Refer to Section E.2., "Adhesive Capsulitis/Frozen Shoulder Disorder," in the original guideline document.

Osteoarticular Allograft Transplantation (OATS) Procedure and Other Cartilage Transplantation Procedures

Osteoarticular allograft transplantation is a procedure which places a plug of cadaveric bone tissue into a chondral defect at the articular surface of an injured bone. Its use has been described in case reports in the treatment of recurrent shoulder instability when large humeral head defects (Hill-Sachs lesions) are thought to be responsible for repeated episodes of subluxation.

Cases with cartilaginous damage to both the humeral head and the glenoid fossa, or larger areas of damage, tend to have more complications and worse outcomes with or without treatment. There is no evidence to support osteochondral allograft transplantation, nor autologous chondrocyte implantation in the shoulder. Debridement and microfracture are commonly performed, especially when cartilage damage is found during other procedures and are acceptable procedures in these cases.

Implantation and transplantation require prior authorization or are *not generally recommended*. They may be appropriate for younger active patients with full thickness cartilage damage who would otherwise qualify for hemiarthroplasty. Hemiarthroplasty or total shoulder replacement are *not recommended* for younger patients.

Recombinant Human Bone Morphogenetic Protein (RHBMP-2)

RhBMP-2 is a member of a family of proteins which are involved in the growth, remodeling, and regeneration of bone tissue. It has become available as a recombinant biomaterial with osteo-inductive potential for application in long bone fracture non-union and other situations in which the promotion of bone formation is desired. In the treatment of non-union of fractures of the humerus and clavicle, no controlled clinical trials have been conducted as of this date, though small case series have resulted in union of some fractures. Ectopic ossification into adjacent muscle has been reported to restrict motion in periarticular fractures. Due to lack of information on the incidence of complications and overall success rate, it is *not recommended*.

No randomized trials of rhBMP-2 for humerus fractures have been found at the time of this guideline publication. Currently, there is a paucity of evidence for its use in fractures of the upper extremity.

Shoulder Replacement (Arthroplasty)

Surgical Indications

The decision of whether a patient receives a total arthroplasty or a hemiarthroplasty depends on the surgeon's discretion. Factors to consider are the presence of glenoid erosions, humeral head subluxation, and rotator cuff strength. There is good evidence that functional outcomes are better at two years for total shoulder arthroplasty as compared with hemiarthroplasty in patients with glenohumeral osteoarthritis.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work activities and the patient should agree to comply with the pre- and post-operative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of post-operative therapy required and the length of partial and full disability expected post-operatively.

Informed decision making should be documented for all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. Since most patients with the most common conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment.

Allergy to implant components can play a role in arthroplasty failure. Pre-operative screening of patients with the following questions is suggested:

1. Do you have an allergy to metal, such as nickel?
2. Have you ever had a rash or itching under jewelry, jean snaps, or watchbands?
3. If you have ever worn artificial nails, did you ever have a skin reaction?
4. Have you ever developed a rash from topical antibiotics, such as Neosporin?

If there are positive or equivocal responses to any of the questions, patch and or lymphocyte proliferation testing is recommended in advance of surgery.

Because smokers have a higher risk of delayed bone healing and post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to

whether smoking cessation is required prior to surgery.

Hemiarthroplasty may utilize a long stem humeral head replacement or a resurfacing device. It may also be performed for humeral head fractures. It has been used for severe arthritis unresponsive to other treatments; however, there is good evidence that functional outcomes are better at two years for total shoulder arthroplasty as compared with hemiarthroplasty in patients with glenohumeral osteoarthritis. In younger active patients the eventual wear on the glenoid cartilage may cause decreased function over time. Total arthroplasty may therefore be preferred in many cases.

Partial humeral head prosthesis may be useful in some cases. Cementless surface humeral head replacement may be indicated in young patients with glenohumeral arthritis and retained glenoid cartilage or osteonecrosis of the humeral head.

Total shoulder arthroplasty is usually performed in cases of severe arthritis when all reasonable conservative measures have been exhausted without sufficient return to activities of daily living. Arthroscopic surgery may be considered in selected patients with a milder degree of arthritis. Arthroscopic Superior Labrum Anterior and Posterior (SLAP) repair is usually *not recommended* in cases of severe arthritis. The rotator cuff should generally be intact or repairable. Consideration of metal allergies and testing is recommended prior to surgery for appropriate patients.

Reverse arthroplasty is generally considered a salvage procedure for patients over 70 with severe osteoarthritis, massive rotator cuff tears and pseudo paralysis with integrity of the deltoid. Good recovery of active elevation can be expected.

Reverse arthroplasty may also be the treatment for failed hemiarthroplasty with extensive cuff tears and/or instability. Most literature confirms that the complication rate is higher and the success rate lower when reverse arthroplasty is performed on a previously operated joint. Older patients report similar activity levels after reverse arthroplasty compared to those with total or hemiarthroplasty. Fifty-three percent of patients with reverse arthroplasty are able to perform high demand activities. The most common complaint was inability to reach overhead.

Procedural complications of hemiarthroplasty or total arthroplasty may include humeral head subluxation or dislocation, humeral and/or glenoid loosening, rotator cuff tear, fractures, stiffness, painful glenoid erosion, transient nerve palsies, heterotopic ossification, bone loss, and component mal-positioning.

Revision surgery may be performed by an orthopedic surgeon in cases with chronic pain and stiffness, painful glenoid erosion, or difficulty with activities of daily living. Prior authorization is required and a second opinion by a surgeon with special expertise in shoulder surgery should usually be performed. In the case of a total failure of the prosthesis, arthrodesis is the salvage procedure.

Operative Treatment

Prosthetic replacement of the articular surfaces of the shoulder.

Post-operative Treatment

Individualized rehabilitation program will be based on communication between the surgeon and the therapist. Timing of passive motion and active rehabilitation is dependent on the type of procedures performed.

Reverse arthroplasty patients may have a more rapid rehabilitation in some cases. Per the recommendation of the surgeon the following therapies may take place: Sling use for the first 3 weeks, ADLs at 3 to 6 weeks, and then gentle strengthening.

Should progress plateau the provider should reevaluate the patient's condition and make appropriate adjustments to the treatment plan. Other therapies may be employed in individual cases.

Gradual return to full activity can occur between 6 to 12 months, depending on the procedure.

Return to work and restrictions after surgery may be made by an experienced primary occupational medicine physician in consultation with the surgeon or by the surgeon. The injured worker should adhere to the written return to work restrictions not only in the workplace, but at home and for 24 hours a day.

Interscalene Anesthesia

Interscalene anesthesia is generally performed for surgical procedures such as subacromial debridement with or without rotator cuff repair. There is some evidence that interscalene regional anesthetic block (ISB) at the time of elective arthroscopic rotator cuff repair results in faster hospital discharge than general anesthesia, therefore ISB is recommended, provided the following precautions are taken.

Interscalene brachial plexus blocks (ISBs) almost always cause hemidiaphragmatic dysfunction acutely, which causes respiratory impairment. This can be symptomatic. Smaller volumes and lower concentrations of bupivacaine may be preferable. Permanent injury of the phrenic nerve has been reported rarely. Permanent or temporary paralysis of the hemidiaphragm can cause significant respiratory impairment, particularly in those with

underlying lung disease. The use of ultrasound guidance on all ISBs is encouraged. Alternative blocks and/or pre-operative pulmonary evaluation should be considered in patients with underlying lung disease and in smokers.

There is some evidence that continuous ISB for 48 hours is associated with somewhat greater pain relief at the seventh post-operative day than single injection ISB, but there is little if any difference in the use of opioids at that time between continuous and single injection anesthesia. There is no convincing evidence that continuous ISB is advantageous and due to the higher cost of ISB and the common respiratory compromise that may be prolonged with continuous use, continuous ISB is *not recommended*.

Continuous Subacromial Anesthesia Injection

There is some evidence that in the setting of arthroscopic rotator cuff repair, a subacromial infusion of 4 ml/hour of 0.5% bupivacaine for 50 hours does not reduce post-operative pain or oxycodone consumption in a clinically meaningful way. Therefore, it is *not recommended*.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Shoulder injury

Guideline Category

Counseling

Management

Rehabilitation

Treatment

Clinical Specialty

Chiropractic

Emergency Medicine

Family Practice

Internal Medicine

Orthopedic Surgery

Physical Medicine and Rehabilitation

Psychiatry

Psychology

Radiology

Sports Medicine

Surgery

Intended Users

Advanced Practice Nurses

Chiropractors

Health Care Providers

Health Plans

Hospitals

Managed Care Organizations

Nurses

Occupational Therapists

Patients

Physical Therapists

Physician Assistants

Physicians

Psychologists/Non-physician Behavioral Health Clinicians

Public Health Departments

Social Workers

Utilization Management

Guideline Objective(s)

To provide advisory and educational guidelines for the treatment of shoulder injury that are enforceable under the Colorado Workers' Compensation Rules of Procedure

Target Population

Individuals qualifying under Colorado's Workers' Compensation Act as injured workers with upper extremity involvement

Interventions and Practices Considered

Non-operative Therapeutic Procedures*

1. Acupuncture
2. Biofeedback
3. Extracorporeal shock wave therapy and radial shock wave therapy
4. Therapeutic injections
    - Botulinum toxin injections
    - Platelet rich plasma
    - Prolotherapy
    - Shoulder joint steroid injections
    - Soft tissue injection
    - Subacromial injections
    - Suprascapular nerve block
    - Trigger point injections and dry needling treatment

- Viscosupplementation/intracapsular acid salts

5. Interdisciplinary rehabilitation programs (formal and informal)
6. Jobsite alteration (ergonomic changes and other interventions)
7. Medications
    - Acetaminophen
    - Minor tranquilizer/muscle relaxants
    - Nonsteroidal anti-inflammatory drugs (NSAIDs)
    - Opioids
    - Platelet rich therapy
    - Psychotropic/anti-anxiety/hypnotic drugs
    - Tramadol
    - Topical drug delivery
8. Orthotics and prosthetics
    - Fabrication/modification of orthotics
    - Orthotic/prosthetic training
    - Splints or adaptive equipment
9. Education/informed decision making
10. Personality/psychosocial/psychological interventions (including cognitive behavioral therapy [CBT] or similar treatment)
11. Restriction of activities
12. Return-to-work
    - Job history interview
    - Coordination of care
    - Communication
    - Establishment of return-to-work status
    - Establishment of activity level restrictions
    - Rehabilitation and return to work
    - Vocational assistance
13. Active therapy
    - Activities of daily living (ADL)
    - Aquatic therapy
    - Functional activities
    - Functional electrical stimulation
    - Neuromuscular re-education
    - Therapeutic exercise
14. Passive therapy
    - Continuous passive motion
    - Electrical stimulation (unattended)
    - Hyperbaric oxygen therapy
    - Immobilization
    - Iontophoresis
    - Low level laser therapy
    - Manipulation
    - Manual electrical stimulation
    - Massage (manual or mechanical)
    - Microwave diathermy
    - Joint mobilization
    - Soft tissue mobilization
    - Superficial heat and cold therapy
    - Transcutaneous electrical nerve stimulation (TENS)
    - Ultrasound (including phonophoresis)

<u>Operative Therapeutic Procedures</u>*

1. Arthrodesis
2. Hardware removal

3. Manipulation under anesthesia
4. Osteoarticular allograft transplantation (OATS) procedure and other cartilage transplantation procedures
5. Recombination human bone morphogenetic protein (RHBMP-2)
6. Shoulder replacement (arthroplasty)
7. Interscalene anesthesia
8. Continuous subacromial anesthesia injection

*Note: Not all of the listed interventions and practices are recommended routinely or generally. See the "Major Recommendations" field and the original guideline document.

Major Outcomes Considered

- Functional improvement (time to return to work, ability to return to original job, etc.)
- Change in pain scores (visual analog scale, pain drawing, etc.)
- Duration of therapeutic effect
- Side effects or complications
- Response rate
- Surgical success rate
- Time on disability

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

General Literature Search Strategy for Medical Treatment Guidelines

Studies were identified through the electronic database of PubMed (with specified search topics), and related links from articles identified by searches. For some articles, Web of Science, a literature citation database, was used when it was desirable to find literature that cited a particular article. Relevant evidence statements from Cochrane and British Medical Journal (BMJ) Clinical Evidence were reviewed. Selected guidelines/systematic reviews were also reviewed. The reference lists from other literature and tables of content from related journals were scanned for relevant articles. Suggestions from various volunteer advisory bodies to the Division of Workers' Compensation were solicited.

Literature reviewed was in English. Literature searches were limited according to study type and human adults. Only randomized clinical trials (RCT) or meta-analyses were used for evidence statements regarding treatment. RCTs that compared an intervention (for example, surgery) with not using that intervention (for example, non-operative treatment) were designated as more relevant to workers' compensation guidelines than those RCTs which compared variations on technique or types of devices.

Beginning with the Traumatic Brain Injury Medical Treatment Guidelines Revision of 2012, if meta-analyses were of high enough quality, then previous RCTs that were incorporated into the selected meta-analyses may not have been individually critiqued. Selected RCTs published after Cochrane meta-analyses were evaluated as to whether they would have likely met the Cochrane inclusion criteria. If so, the Cochrane software (RevMan) was used to update the pooled effect measure and compare it with the original Cochrane report. Diagnostic accuracy studies were critiqued for diagnostic testing evidence and cohort, cross-sectional and case-control studies were critiqued for causation evidence statements. Literature which did not meet requirements for evidence statements could be referenced if it furnished useful background information or described interventions which are considered generally accepted by a consensus of health care providers. This information sometimes contributed to consensus decisions by the multidisciplinary task force drafting the guidelines. Literature that was determined either be unrelated to the clinical issue, did not reflect interventions likely to occur in Colorado, or which had such poor quality on initial review that it could not qualify for evidence nor provide meaningful input was not critiqued. All articles sent by the public were formally reviewed.

Specific Search Strategy

All searches were done on PubMed. The literature search included articles published from January 1987 to August 2013. The search was conducted in August 2013. Because the literature search was conducted concurrently with the Thoracic Outlet Syndrome Medical Treatment Guidelines, there was overlap in the literature search.

Search terms included: Acromioclavicular Joint; Adhesive Capsulitis/Frozen Shoulder; Bicipital Tendon Disorder; Brachial Plexus Injuries; Axillary Nerve; Long Thoracic Nerve; Musculocutaneous Nerve; Spinal Accessory Nerve; Suprascapular Nerve; Rotator Cuff Tear Tendinopathy (Bursitis); Calcifying Tendonitis; Clavicular Fracture; Proximal Humeral Fracture; Humeral Shaft Fracture; Scapular Fracture; Sternoclavicular Dislocation/Fracture; Impingement Syndrome; Rotator Cuff Tear; Shoulder Instability/Glenohumeral Instability; SLAP Lesion.

Inclusion Criteria

- Studies in English
- Human
- Adults
- Limiting criteria: RCT OR Meta-analysis

Abstracts were reviewed and articles were then excluded based on the criteria below:

- Lack of relevancy to workers' compensation shoulder injury population
- Major obvious errors in study protocol (e.g., lack of control group even though study was listed as an RCT)
- Whether they were included in another meta-analysis (e.g., Cochrane Collaboration, BMJ Clinical Evidence)
- Duplicates
- Study too old
- Cadaverous studies
- Pediatric population
- Preliminary results
- Healthy volunteers
- Studies not applicable to treatment guidelines spine conditions, such as tumor studies
- Studies too technical in nature to meet the objective of the guideline (examples, types of screws used in surgery)

Number of Source Documents

Number of articles initially identified: 391

Number of articles excluded from those initially identified: 85

Number of articles selected for further review: 306

105 studies were ultimately included as evidence statements.

Methods Used to Assess the Quality and Strength of the Evidence

Subjective Review

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Systematic Reviews and Meta-Analyses

Criterion	Green	Yellow	Red	Comments
The study is in fact identified as a	"Systematic review," "meta-analysis," or both, are in the title of the article, and the abstract supports the design in the title	The title is ambiguous, but the abstract shows that	The article is a narrative review or an overview,	"Systematic review" and "meta-analysis" are generally recognized terms for a

Criterion	Green	Yellow	Red	Comments
systematic review or meta-analysis		the authors did a systematic review	or is done by a single author	specific type of original research; narrative reviews are subject to biases which systematic reviews and meta-analyses methodically control for
Objectives of the systematic review or meta-analysis	Clearly stated in terms of PICOS: Patient population (disease, age, setting), Intervention (dose, frequency, etc.), Comparator (control group interventions), Outcome (morbidity, mortality, symptoms, function), and Study design (randomized trials only, broader design criteria)	PICOS elements all reported, but some ambiguity in some elements (e.g., Comparator described as "standard care" or "usual care" without further description)	One or more PICOS element missing or uninterpretable	The question being addressed should be clear from the abstract; it may be narrow or broad, but the scope and potential applicability should be well defined
Characteristics of eligible studies	In addition to PICOS, study characteristics defined in terms of restrictions for inclusion (e.g., minimum length of follow-up, whether co-interventions are included), and scope of reports (language, years of publication, unpublished material)	Ambiguity exists for some of the characteristics of eligible studies	Eligibility of studies is unclear, and scope of reports is not specified	
Information sources	Multiple information sources are clearly specified: databases (PubMed, Ovid, EMBASE, Cochrane, Web of Science), hand searches of tables of contents of relevant journals, meeting abstracts, reference lists, contacts with authors, manufacturers, trial registries)	Search limited to published material from two or more sources, without additional searching of registries or contact with authors	Search limited to a single information source (e.g., PubMed only)	While PubMed is a large and nearly comprehensive database, its yield can be influenced by how articles are indexed by the National Library of Medicine; additional sources of information can materially affect the conclusions of a systematic review or meta-analysis
Search strategy	Full electronic search strategy for at least one major database, with dates (e.g., PubMed 1970-October 2009), limits, combinations of search terms, such that it can be replicated by the reader	Databases and search terms are given, but there is some ambiguity in the strategy (e.g., PubMed "through 2007"), and replication by the reader would be difficult	Databases and search terms are too broad and vague to permit replication by the reader	Often given in an appendix to the article or in an online supplement, the strategy should be readily accessible
Study selection	Specification of which criteria determine eligibility for inclusion (e.g., randomization to specified interventions, which outcomes were required to be reported) and for quality (e.g., allocation concealment, intention-to-treat analysis, blinding) with at least two reviewers identified by initials; inter-rater agreement and methods of resolving disagreement are specified; a flow diagram enumerates articles retrieved from search, articles excluded after screening, and articles included for meta-analysis	Two or more reviewers screen articles for inclusion, but there is some ambiguity in the criteria for inclusion or for inter-rater agreement and methods of resolving disagreement; flow diagram is lacking	Only one reviewer selects studies; criteria are vague	Quality assessment should focus on risk of bias; scoring of articles for quality is not necessary and may be misleading. There is no standard process for selecting studies, but the process used by the reviewers should be clear enough to allow the reader to determine which studies might meet the test of inclusion
Outcomes for analysis	Meta-analysis is restricted to pre-specified primary and secondary outcomes, and exploratory (hypothesis-generating) analyses in the source literature are excluded from meta-analysis	Meta-analysis combines pre-specified primary and secondary outcomes in the source literature	Meta-analysis treats exploratory analyses in source literature on an equal	Exploratory analyses are too likely to be reported when they arise from the play of chance, and should not be included in any meta-analysis of the same outcomes; their

Criterion	Green	Yellow	Red	Comments
		with exploratory analyses in the same literature, but assigns exploratory analyses a lower weight	basis with the pre-specified primary and secondary analyses	inclusion is likely to bias the meta-analysis
Summary measures for meta-analysis with or without pooled Number Needed to Treat (NNT)	Principal summary measures (relative risk, risk difference, odds ratio, difference in means, hazard ratio) are specified and appropriate to the outcome measure; if NNT are reported, there is a fixed event rate in the control groups for the studies being combined	Risk ratios or odds ratios are reported, and NNT is not reported if there is a difference in the control group event rates across the different studies	Risk ratios or odds ratios are reported, but NNT is reported even when there is a difference in control group event rates across the different studies (the underlying baseline risks are not equal)	Relative risks and odds ratios are generally more stable for summary measures than risk differences; pooled NNT is misleading if the control group event rate (the baseline risk) is different across studies, even if the risk ratio is the same
Meta-analysis presentation	Results of meta-analysis are presented as an estimated summary effect (with confidence interval) across all included studies, displaying a forest plot with weights and confidence intervals for the included studies; a measure of heterogeneity is presented (e.g., I^2); the choice of fixed effect or random effects model is explained, and, if there is significant heterogeneity, there is an attempt to examine possible sources of heterogeneity	Estimated summary effect with confidence interval, with an estimate of heterogeneity, and an explanation of the choice of fixed or random effects model; however, an examination of sources of heterogeneity is lacking	Summary effect measure with confidence interval, but heterogeneity measures and examinations are lacking	No hard and fast rule dictates the choice of model, but because a fixed effect model assumes a single common effect size across studies, there should be a discussion of why it is appropriate for the included studies

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Criteria for evidence are drawn principally from the Cochrane Risk of Bias tool for individual randomized trials and from the PRISMA statement for systematic reviews. Nonrandomized trials may sometimes be upgraded to evidence statements when all Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria are met.

The strength and limitations of the body of evidence are clearly identified. Division of Workers' Compensation Assessment Criteria on Systematic Reviews and Meta-analyses list assessment criteria for strengths and limitations of selected bodies of literature (see the "Rating Scheme for the Strength of the Evidence" field). Also, areas that do not have evidence and thus are consensus-based are delineated in the guidelines.

The evidence table contains summaries of the critiques that were completed for individual scholarly articles used in the Shoulder Injury Medical Treatment Guidelines. Scholarly articles are given an assessment of "adequate," "inadequate," or "high quality." When Division of Workers' Compensation staff completed additional statistical pooling, this is noted in the "Division Assessment" column using RevMan (Cochrane Collaboration of Systematic Reviews). These are denoted with a **. In multiple cases, literature from the Cochrane Collaboration was reviewed.

It should be noted that one scholarly article may be graded at different levels for different interventions. For those deemed inadequate, a brief rationale is provided. The criteria for the aforementioned assessment designations are located on the Colorado Division of Workers' Compensation

Web site .

The articles that are graded as either adequate or high quality are then translated into "some evidence," "good evidence," and "strong evidence" as defined in the General Guidelines Principles, located in each of the Division Medical Treatment Guidelines (see the "Rating Scheme for the Strength of the Recommendations" field).

Because the guideline developers synthesize the medical evidence as much as possible, one assessment (or group of assessments) may potentially create more than one evidence statement. It is also possible that two assessments may be combined (e.g., two "adequates" to create a higher level of evidence [for example, elevating a statement from "some" to "good" evidence]).

The evidence table is a summary and is based on critiques of scholarly articles. The full critiques are publicly available on the Division of Workers' Compensation Web site (see the "Availability of Companions Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Evidence statements are formatted. General clinical reviews are collected and used to make suggested recommendations for consensus consideration. The Task Force reaches consensus by vote (unanimous decision in most cases). The health benefits, side effects and risks are considered in formulating the recommendations. These are fully described for groups and considered by the Task Force. There is an explicit link between recommendations and supporting evidence (presented in the referenced version of the guideline on the Department of Workers' Compensations Web site, wherein each evidence statement is accompanied by author and year of the bibliography/critiqued article).

Guidelines Updating Process

The State of Colorado Division of Workers' Compensation Medical Treatment Guidelines updating process is completed in several stages. Initially, current medical literature related to the guideline is systematically reviewed, critiqued, and graded by the Division and the multi-disciplinary Task Force. Next, appropriate medical evidence and consensus are incorporated concurrently into the Guideline, section by section. During this stage, Task Force members will be appointed for projects, working in sub-groups or individually, according to the task.

Guideline updating processes and resources dedicated to supporting the Task Force includes:

- Medical literature review and grading, with the assistance of a professional Research Methodologist
- Evidence and consensus parameters to assist in the revision and evaluation of treatment recommendations
- A multi-disciplinary Advisory Panel and other advisory bodies to provide clinical feedback to the Task Force and the Division
- Administrative support and coordination, allowing participants to focus on clinical issues
- Opportunities for members to provide feedback on ways to improve the update process

Selection of Task Force Members

Health care disciplines required to participate in the task force process are identified. Individuals selected should be Level I or II Accredited Providers (if applicable), Board Certified in their area of specialty, in good standing within their medical specialty organization, and specialize in treatment of injured workers. Task force membership also includes non-physician members of the workers' compensation system, such as: therapists, psychologists, attorneys, and risk managers. Prior task force participation is not necessary.

Grading Recommendations

Graded consensus recommendations were developed based on the considered judgment of the multi-disciplinary Task Force, which considered the volume and consistency of the evidence and the generalizability and clinical impact of the recommendations.

Rating Scheme for the Strength of the Recommendations

Grades of Recommendation

"Some" means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division

recognizes that further research is likely to have an impact on the intervention's effect.

"Good" means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research may have an impact on the intervention's effect.

"Strong" means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is unlikely to have an important impact on the intervention's effect.

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

After the internal panel/task force draft is complete it goes to an extensive external expert panel for review and response.

Advisory Panel

The Guidelines update process includes an additional review, conducted by an Advisory Panel and other advisory bodies that may consist of past Task Force members and clinical experts representing medical specialty organizations and associations. Professionals representing adjunct aspects of patient care, such as Risk Managers, Case Managers, and Insurers, are also included in this stage. The purpose of the external review is to provide additional sources of expertise in order to finalize draft guideline material developed by the Task Force.

Solicitation of Public Commentary

An active, open process to solicit public commentary on a year-round basis is in place in order to maximize community-based physician input and support. Contact with Accredited Providers is done through direct mailings and at Accreditation seminars.

Post Task Force Questionnaire

A survey will be sent to all Task Force members once the updated draft guidelines are completed. The survey will rate Task Force participants' satisfaction with the processes used, and evaluate Division personnel and performance. Information may be used to improve future Task Force processes.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is not specifically stated.

Only randomized controlled trials or meta-analyses were used for evidence statements regarding treatment.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Optimal medical treatment for workers with a shoulder injury
- Evidence of benefits of specific treatment interventions is reviewed in the relevant sections of the original guideline document and in the evidence summary companion document (see the "Availability of Companion Documents" field).

Potential Harms

- Injuries, side effects, or infections from therapeutic injections
- Side effects and drug interactions from medications
- Complications from operative procedures
- Injury from device or component failure

See specific sections of the original guideline document for detailed descriptions of potential harms.

Contraindications

Contraindications

- Contraindications to surgery include anticoagulation or bleeding diatheses, significant osteopenia, or recent surgical repair of shoulder soft tissue, fracture or neurological lesion.
- Pseudo paralysis or severe rotator cuff arthropathy are contraindications to arthroscopic biceps tenotomy.
- General contraindications to injections include local or systemic infection, bleeding disorders, allergy to medications used and patient refusal. Specific contraindications may apply to individual injections.
- Celecoxib is contraindicated in sulfonamide allergic patients.
- Systemic administration of salicylate and nonsalicylate pain medication is relatively contraindicated in patients with hypertension, cardiac failure, or renal insufficiency.
- Deltoid function is a requirement for reverse arthroplasty; therefore, severe impairment of deltoid contraction is a contraindication. If only the supraspinatus is torn in an arthritic shoulder, a total shoulder arthroplasty, rather than a reverse arthroplasty, is appropriate. If a patient with a massive rotator cuff tear can nevertheless elevate the shoulder, non-operative treatment such as nonsteroidal anti-inflammatory drugs (NSAIDs) and steroid injections are preferable to surgery.

Qualifying Statements

Qualifying Statements

- This document has been prepared by the Colorado Department of Labor and Employment, Division of Workers' Compensation (Division) and should be interpreted within the context of guidelines for physicians/providers treating individuals qualifying under Colorado's Workers' Compensation Act as injured workers with upper extremity involvement.
- Although the primary purpose of this document is advisory and educational, these guidelines are enforceable under the Workers' Compensation Rules of Procedure, 7 CCR 1101-3. The Division recognizes that acceptable medical practice may include deviations from these guidelines, as individual cases dictate. Therefore, these guidelines are not relevant as evidence of a provider's legal standard of professional care.
- To properly utilize this document, the reader should not skip nor overlook any sections.
- The Division provides procedures to implement medical treatment guidelines and to foster communication to resolve disputes among the provider, payer, and patient through the Workers' Compensation Rules of Procedure. In lieu of more costly litigation, parties may wish to seek administrative dispute resolution services through the Division or the Office of Administrative Courts.

Implementation of the Guideline

Description of Implementation Strategy

Description of Implementation Strategy

The principles summarized in this section are key to the intended implementation of all Division of Workers' Compensation guidelines and critical to the reader's application of the guidelines in this document.

1. Application of Guidelines. The Division provides procedures to implement medical treatment guidelines and to foster communication to resolve disputes among the provider, payer, and patient through the Workers' Compensation Rules of Procedure. In lieu of more costly litigation, parties may wish to seek administrative dispute resolution services through the Division or the Office of Administrative Courts.
2. Education. Education of the patient and family, as well as the employer, insurer, policy makers and the community should be the primary emphasis in the treatment of chronic pain and disability. Currently, practitioners often think of education last, after medications, manual therapy, and surgery. Practitioners must implement strategies to educate patients, employers, insurance systems, policy makers, and the community as a whole. An education-based paradigm should always start with inexpensive communication providing reassuring and evidence-based information to the patient. More in-depth patient education is currently a component of treatment regimens which employ functional, restorative, preventive, and rehabilitative programs. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms and prevention.
3. Informed Decision Making. Providers should implement informed decision making as a crucial element of a successful treatment plan. Patients, with the assistance of their health care practitioner, should identify their personal and professional functional goals of treatment at the first visit. Progress towards the individual's identified functional goals should be addressed by all members of the health care team at subsequent visits and throughout the established treatment plan. Nurse case managers, physical therapists, and other members of the health care team play an integral role in informed decision making and achievement of functional goals. Patient education and informed decision making should facilitate self-management of symptoms and prevention of further injury.
4. Treatment Parameter Duration. Time frames for specific interventions commence once treatments have been initiated, not on the date of injury. Obviously, duration will be impacted by patient compliance, as well as availability of services. Clinical judgment may substantiate the need to accelerate or decelerate the time frames discussed in this document.
5. Active Interventions. Active interventions emphasizing patient responsibility, such as therapeutic exercise and/or functional treatment, are generally emphasized over passive modalities, especially as treatment progresses. Generally, passive and palliative interventions are viewed as a means to facilitate progress in an active rehabilitation program with concomitant attainment of objective functional gains.
6. Active Therapeutic Exercise Program. Exercise program goals should incorporate patient strength, endurance, flexibility, coordination, and education. This includes functional application in vocational or community settings.
7. Positive Patient Response. Results are defined primarily as functional gains that can be objectively measured. Objective functional gains include, but are not limited to, positional tolerances, range-of-motion (ROM), strength, endurance, activities of daily living, cognition, psychological behavior, and efficiency/velocity measures which can be quantified. Subjective reports of pain and function should be considered and given relative weight when the pain has anatomic and physiologic correlation. Anatomic correlation must be based on objective findings.
8. Re-evaluate Treatment Every Three to Four Weeks. If a given treatment or modality is not producing positive results within three to four weeks, the treatment should be either modified or discontinued. Before discontinuing the treatment, the provider should have a detailed discussion with the patient to determine the reason for failure to produce positive results. Reconsideration of diagnosis should also occur in the event of a poor response to a seemingly rational intervention.
9. Surgical Interventions. Surgery should be contemplated within the context of expected functional outcome and not purely for the purpose of pain relief. The concept of "cure" with respect to surgical treatment by itself is generally a misnomer. All operative interventions must be based upon positive correlation of clinical findings, clinical course, and diagnostic tests. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic conditions.
10. Six-Month Time Frame. The prognosis drops precipitously for returning an injured worker to work once he/she has been temporarily totally disabled for more than six months. The emphasis within these guidelines is to move patients along a continuum of care and return to work within a 6-month time frame, whenever possible. It is important to note that time frames may not be pertinent to injuries that do not involve work-time loss or are not occupationally related.
11. Return-to-Work. Return-to-work is therapeutic, assuming the work is not likely to aggravate the basic problem or increase long-term pain. The practitioner must provide specific physical limitations and the patient should never be released to non-specific and vague descriptions such as "sedentary" or "light duty." The following physical limitations should be considered and modified as recommended: lifting, pushing, pulling, crouching, walking, using stairs, bending at the waist, awkward and/or sustained postures, tolerance for sitting or standing, hot and cold environments, data entry and other repetitive motion tasks, sustained grip, tool usage and vibration factors. Even if there is residual chronic pain, return-to-work is not necessarily contraindicated.
    The practitioner should understand all of the physical demands of the patient's job position before returning the patient to full duty and should request clarification of the patient's job duties. Clarification should be obtained from the employer or, if necessary, including, but not limited to, an occupational health nurse, occupational therapist, vocational rehabilitation specialist, or an industrial hygienist.

12. Delayed Recovery. Strongly consider a psychological evaluation, if not previously provided, as well as initiating interdisciplinary rehabilitation treatment and vocational goal setting, for those patients who are failing to make expected progress 6 to 12 weeks after an injury. The Division recognizes that 3 to 10% of all industrially injured patients will not recover within the timelines outlined in this document, despite optimal care. Such individuals may require treatments beyond those discussed within this document, but such treatment will require clear documentation by the authorized treating practitioner focusing on objective functional gains afforded by further treatment and impact upon prognosis.
13. Guideline Recommendations and Inclusion of Medical Evidence. *All recommendations are based on available evidence and/or consensus judgment*. When possible, guideline recommendations will note the level of evidence supporting the treatment recommendation. It is generally recognized that early reports of a positive treatment effect are frequently weakened or overturned by subsequent research. When interpreting medical evidence statements in the guideline, the following apply:
    - Consensus means the judgment of experienced professionals based on general medical principles. Consensus recommendations are designated in the guideline as "generally well-accepted," "generally accepted," "acceptable/accepted," or "well-established."
    - "Some evidence" means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division recognizes that further research is likely to have an impact on the intervention's effect.
    - "Good evidence" means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research may have an impact on the intervention's effect.
    - "Strong evidence" means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is unlikely to have an important impact on the intervention's effect.

    All recommendations in the guideline are considered to represent reasonable care in appropriately selected cases, irrespective of the level of evidence or consensus statement attached to them. Those procedures considered inappropriate, unreasonable, or unnecessary are designated in the guideline as "*not recommended.*"
14. Care Beyond Maximum Medical Improvement (MMI). Care beyond MMI should be declared when a patient's condition has plateaued to the point where the authorized treating physician no longer believes further medical intervention is likely to result in improved function. However, some patients may require treatment after MMI has been declared in order to maintain their functional state. The recommendations in this guideline are for pre-MMI care and are not intended to limit post-MMI treatment.

The guideline document should be interpreted within the parameters of these guideline principles that may lead to more optimal medical and functional outcomes for injured workers.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Colorado Division of Workers' Compensation. Shoulder injury medical treatment guidelines. Denver (CO): Colorado Division of Workers' Compensation; 2015 Feb 1. 164 p.

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2015 Feb 1

Guideline Developer(s)

Colorado Division of Workers' Compensation - State/Local Government Agency [U.S.]

Source(s) of Funding

Colorado Division of Workers' Compensation

Guideline Committee

Shoulder Injury Task Force and Cervical Spine and Shoulder Injury Advisory Panel

Composition of Group That Authored the Guideline

Not stated

Financial Disclosures/Conflicts of Interest

Financial disclosures are on file.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Colorado Division of Workers' Compensation Web site .

Availability of Companion Documents

The following are available:

- Shoulder injury medical treatment guidelines. Referenced version. Denver (CO): Colorado Division of Workers' Compensation; 2015 Feb 1. 227 p. Available from the Colorado Division of Workers' Compensation Web site .
- Literature search: shoulder medical treatment guidelines—Search terms and topics. Denver (CO): Colorado Division of Workers'

Compensation. 2008 Sep. 2 p. Available from the Colorado Division of Workers' Compensation Web site .
- Evidence summary: shoulder injury medical treatment guidelines. Denver (CO): Colorado Division of Workers' Compensation. 27 p.
- General literature search strategy for medical treatment guidelines. Denver (CO): Colorado Division of Workers' Compensation. 1 p. Available from the Colorado Division of Workers' Compensation Web site .
- Division of Workers' Compensation medical treatment guidelinesâ€methodology. Denver (CO): Colorado Division of Workers' Compensation. 10 p. Available from the Colorado Division of Workers' Compensation Web site .

In addition, related critiques are available from the Colorado Division of Workers' Compensation Web site . Assessment criteria for critiques are also available from the Colorado Division of Workers' Compensation Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on August 26, 2016. The information was not verified by the guideline developer.

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